

This listing of claims will replace all prior versions, and listings, of claims in the application.

LISTING OF CLAIMS

53. (currently amended) A digital representation of an analog signal,
the digital representation being characterized in that wherein:

the digital representation includes a representation of a copy detection signal
~~that whose is sensitive sensitivity~~ to transformations produced by digital-to-analog and
analog-to-digital conversions is not based on a watermark contained in the copy
detection signal,

~~whereby~~ the representation of the copy detection signal ~~may be~~ being comparable with
the copy detection signal of another digital representation –used to determine a
copying relationship of the analog signal to whether another the other digital
representation of the analog signal ~~was made by digitizing an analog signal produced~~
~~from the digital representation.~~

54. (canceled)

55. (currently amended) A method of creating a digital authentication pattern that
permits non-watermark-based determination of a copying relationship of a digital
representation of an object with which the digital authentication pattern is associated,
the digital authentication pattern containing~~contains~~ a message, the digital
authentication pattern belonging to a digital representation of an object with which the
digital authentication pattern is associated, and the digital authentication pattern
including a plurality of pattern elements that have pattern element values and the
method comprising:

selecting a sets of the pattern elements ~~belonging to the digital authentication~~
~~pattern to carry represent~~ message elements of the message; and

for a pattern element belonging to the each ~~selected set of pattern elements,~~
setting the pattern element's pattern element value ~~values of the pattern elements in~~
~~the set to carry represent~~ the message element such that setting the pattern element's
value to represent the message element leaves the digital authentication pattern's

~~ability to detect~~usefulness in determining the copying relationship ~~remains~~
substantially unchanged.

56. (currently amended) The method according to claim 55, ~~further comprising~~wherein:

in the step of setting the pattern element value, ~~setting the~~ pattern element
values is set such that the entropy of the digital authentication pattern is substantially
unchanged.

57. (currently amended) The method according to claim 55, wherein:

in the step of setting the pattern element value, the message elements specify
~~values~~ies a message element value belonging to a range thereof; and the pattern
element value of the pattern element belonging to the a selected set of pattern
elements is set to ~~indicate a message element specifying~~ one of the values of the
range, ~~in said setting act.~~

58. (currently amended) The method according to claim 57 wherein:

in the step of setting the pattern element value, the selected set is set using a key, ~~in~~
~~said setting act.~~

59. (currently amended) The method according to claim 57 wherein:

in the step of setting the pattern element value, the pattern element value of the
pattern element belonging to the selected set of pattern elements belongs to one of at
least two categories of pattern element values~~sets of pattern elements belong to~~
~~categories thereof,~~ the category of a ~~the set of pattern elements~~ value indicates
represents the ~~value of a message element contained therein,~~ and the ~~set of pattern~~
elements is given a category as required for the ~~value of the message element~~ value
of the message element represented by the pattern element, ~~in said setting act.~~

60. (currently amended) The method according to claim 59 wherein:

the ~~sets of pattern element~~ values in the selected sets belong to two
categories.

61. (currently amended). The method according to claim ~~59~~60, wherein:

in the step of setting the pattern element value, the values of the pattern elements in the selected set ~~are~~is inverted in magnitude to indicate ~~a value belonging to a category, in said setting act.~~

62. (currently amended) The method according to claim 55, wherein:

in the step of setting the pattern element value, the message is encoded using a key.

63. (currently amended) The method according to claim 55, wherein:

in the step of setting the pattern element value, ~~in said selecting act~~, a key is used to select the set of pattern elements that ~~an~~represent message values~~element of the message is inserted into.~~

64. (currently amended) The method according to claim 55 wherein:

the pattern element is a primitive element of the digital representation to which the digital authentication pattern belongs.

65. (currently amended) A storage device ~~wherein~~that is characterized in that:

the storage device contains code which, when executed by a processor, implements the method according to claim 55.

66. (currently amended) A digital authentication pattern that permits non-watermark-based determination of a copying relationship of a digital representation of an object with which the digital authentication pattern is associated, the digital authentication pattern containing~~contains~~ a message; and the digital authentication pattern comprising:

a plurality of ~~sets of~~ pattern elements, the plurality of ~~sets of~~ pattern elements including a set of the pattern elements that represent ~~sets thereof that carry~~ message elements ~~belonging to~~of the message; and

in a ~~set that carries a~~pattern element that represents a message element, the ~~set's value~~value of the pattern element is ~~are~~ set such that setting the value of the pattern element to represent the message element leaves the digital authentication

pattern's ~~ability to~~usefulness in ~~detect copying remain~~determining the copying relationship substantially unchanged.

67. (currently amended) The digital authentication pattern according to claim 66, wherein:

the pattern element's values~~are~~is set such that an entropy of the digital authentication pattern is substantially unchanged from a digital authentication pattern that does not contain a message.

68. (currently amended) The digital authentication pattern according to claim 66, wherein:

the message elements ~~specify~~specifies a values belonging to a range thereof; and

a pattern element that represents the message element~~in a set that carries message elements, the set's values are~~is set to indicate ~~a message element specifying~~ one of the values of the range.

69. (currently amended) The digital authentication pattern according to claim 68 wherein:

the ~~sets of~~ pattern elements values belong to categories thereof;

the category of a ~~set of~~ pattern element values~~indicates~~represents the value of ~~a~~the message element ~~contained therein~~represented thereby; and

~~in a set that carries message elements, the set has a category as required for the value of the message element.~~

70. (previously presented) The digital authentication pattern according to claim 66, wherein:

the pattern element is a primitive element of the digital representation to which the digital authentication pattern belongs.

71. (previously presented) The digital authentication pattern according to claim 70, wherein:

the pattern element is a pixel.

72. (previously presented) The digital authentication pattern according to claim 70, wherein:

the digital representation is a representation of an audio signal and the pattern element is a primitive of the representation of the audio signal.

73. (previously presented) The digital authentication pattern according to claim 70, wherein:

the digital representation is a representation of a video signal and the pattern element is a primitive of the representation of the video signal.

74. (currently amended) A storage device ~~wherein~~ which is characterized in that:

the storage device contains the digital authentication pattern according to claim 66.

75. (currently amended) A method of reading a message contained in a digital authentication pattern, the digital authentication pattern permitting non-watermark-based determination of a copying relationship of a digital representation of an object with which the digital authentication pattern is associated, the digital authentication pattern including that includes a plurality of pattern elements having pattern element values, the pattern elements including a sets of pattern elements that have pattern element values, representing message elements of the message, the values of the set of pattern elements having been set to represent the message elements such that the digital authentication pattern's usefulness in determining the copying relationship remains substantially unchanged, and the method comprising:

selecting the sets of the pattern elements from the plurality, said selected sets carrying whose pattern element values represent message elements of the message and ~~the values of said selected set's pattern elements being set such that the digital authentication pattern's ability to detect copying remains substantially unchanged; and~~

for each pattern element belonging to the each selected set, comparing the ~~selected set~~ pattern element with equivalent ~~sets pattern elements~~ that have a possible

~~value of the message element~~ value to determine ~~a value of the message element~~
values of the message elements in the selected set.

76. (currently amended) The method according to claim 75 further comprising:

after the message has been read, creating an equivalent digital authentication pattern to the digital authentication pattern that contains the message, whereby the digital authentication pattern that contains the message is comparable with the equivalent digital authentication pattern to determine ~~a~~ the copying relationship with regard to a digital representation that contains the digital authentication pattern that contains the message.

77. (currently amended) The method according to claim 76 wherein:

~~in said creating act~~ the step of creating, the equivalent digital authentication pattern is created by replacing ~~sets of~~ pattern elements in the equivalent digital authentication pattern that belong to the selected set ~~therein that do not carry message elements~~ with equivalent sets of pattern elements that ~~do carry~~ represent the message elements.

78. (currently amended) The method according to claim 75, wherein:

the message element values ~~s specify values belonging~~ belong to a range thereof; and the equivalent ~~sets of~~ pattern elements include a ~~set~~ pattern element for each of the values in the range thereof.

79. (currently amended) The method according to claim 75 wherein:

the selection of the set of pattern elements is done using a key, ~~in said selecting act~~.

80. (currently amended) The method according to claim 78 wherein:

the ~~sets of~~ pattern elements belong to categories thereof;

the category of a ~~set of~~ pattern elements indicates the value of ~~a~~ the message element ~~contained therein~~ represented by the pattern element, and the equivalent ~~sets~~

pattern elements include a ~~set~~pattern element for each of the categories, ~~in said comparing act.~~

81. (currently amended) The method according to claim 80, wherein:

the ~~sets of~~ pattern element values that represent message elements belong to two categories.

82. (currently amended) The method according to claim ~~80~~81, wherein:

~~a set of pattern elements whose original values have been inverted indicates a message element value corresponding to the category of the set of pattern elements, in said comparing act~~ one of the categories is represented in the pattern element value by inverting the pattern element's value.

83. (currently amended) The method according to claim 75, wherein:

a message element is repeated in ~~the~~ a plurality of sets of pattern elements and further comprising:

for each of the pattern elements that represents the repeated message element, comparing the pattern element that represent the repeated message element with candidate pattern elements that represent each of the possible values of the message element to determine a score with regard to the pattern element for each candidate pattern element;

accumulating for each possible value of the message element, scores for each of the pattern elements that represents the repeated message elements; and

~~comparing sets of pattern elements containing the repeated message element to statistically~~ using the accumulated scores to determine ~~a~~ the value of the repeated message element.

84. (currently amended) A storage device ~~wherein~~ characterized in that:

the storage device contains code which, when executed by a processor, implements the method according to claim 75.